Pediatric Upper Extremity Sports Injuries

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Disclaimer

I have no financial conflicts of interests to disclose.
Outline

Overuse injuries shoulder and elbow
- Little leaguer’s shoulder
- Scapular dyskinesia, SLAP tears
- Stress fxs
- Osteochondral injury
- Ulnar collateral ligament injuries
- Prevention/treatment

Traumatic shoulder dislocations
- Surgical management

Imaging Pearls
Lacking in overhead youth sports

Large scale study under way at Bassett

Gugenheim et al AJSM 1976
- 595 pitchers - 17% elbow sx, 12% contractures

Larson et al AJSM 1976
- 120 pitchers, 20% elbow sx, 10% contractures, 12% with xray abn medial epicondyle, 5% radiocapetellar abn

Pasternack et al Pediatrics 1996
- Ball/collision injuries more common than overuse
Head Injuries

- **Common in many youth sports**

  - **AJSM 2010**

  - High School Concussions in the 2008-2009 Academic Year
    
    **Mechanism, Symptoms, and Management**
    
    William P. Meehan III, MD, Pierre d’Hemecourt, MD, and R. Dawn Comstock, PhD
    
    Investigation performed at the Sports Concussion Clinic, Division of Sports Medicine, Children’s Hospital Boston, Boston, Massachusetts

  - 136,000 conc/year in HS sport
  - 76% due to contact injury with another player
  - 5% LOC
  - 1.5% >1 mo sx
  - Computerized neuropsych testing $\rightarrow$ delayed RTP
<table>
<thead>
<tr>
<th>Symptom Recorded</th>
<th>No. of Concussions Resulting in Symptom</th>
<th>Percentage of Concussions Resulting in Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>508</td>
<td>93.4</td>
</tr>
<tr>
<td>Dizziness/unsteadiness</td>
<td>406</td>
<td>74.6</td>
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<tr>
<td>Difficulty concentrating</td>
<td>308</td>
<td>56.6</td>
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<tr>
<td>Confusion/disorientation</td>
<td>250</td>
<td>46.0</td>
</tr>
<tr>
<td>Vision changes/sensitivity to light</td>
<td>204</td>
<td>37.5</td>
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<tr>
<td>Nausea</td>
<td>157</td>
<td>28.9</td>
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<tr>
<td>Drowsiness</td>
<td>144</td>
<td>26.5</td>
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<tr>
<td>Amnesia</td>
<td>132</td>
<td>24.3</td>
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<tr>
<td>Sensitivity to noise</td>
<td>103</td>
<td>18.9</td>
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<tr>
<td>Tinnitus</td>
<td>58</td>
<td>10.7</td>
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<tr>
<td>Irritability</td>
<td>50</td>
<td>9.2</td>
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<tr>
<td>Loss of consciousness</td>
<td>25</td>
<td>4.6</td>
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<tr>
<td>Hyperexcitability</td>
<td>12</td>
<td>2.2</td>
</tr>
<tr>
<td>Other</td>
<td>41</td>
<td>7.5</td>
</tr>
</tbody>
</table>
Clearance: Can he play doc??

- Return to play eval
  - Baseline, post injury computerized neuropsych testing
- Acute eval
  - Serial 7s
  - Spell WORLD backwards
  - What’s the score and quarter?
- Follow Sxs for resolution
  - Headache
  - Photophobia
  - Difficulty concentrating
Return to Play

- No high school athlete should RTP same day
  - Repeated 2\textsuperscript{nd} hits $\rightarrow$ long term neuropsych effects

- 24 hrs symptom free

- 24 hrs of light cardio

- If still symptom free advance to full noncontact practice, then contact

- Positive LOC - no contact x 1 week
Little Leaguer’s Shoulder

- Stress related injury to proximal humeral physis in young teen throwers
- TTP proximally, painful throwing
- Xray show lateral physis widening, metaphyseal sclerosis, lateral epiphysis fragmentation
- Resolves with rest, conservative rx
Physeal Alterations

- Repetitive throwing may lead to increased torsion though the physis
- Older throwers have increased ER, decreased IR
  - Altered physeal anatomy (increased retroversion)
  - Tight posterior capsule
Scapular Dyskinesia

- Repetitive throwing follow through $\rightarrow$ tight posterior capsule
- Abnormal scapulothoracic motion to achieve IR, GH IR deficit
- Pec minor tightens
- Scapular protraction and tilt
- Subacromial Impingement
- Bursal sided cuff injury
“SICK” Scapula

- Scapular malposition
- Inferior medial border prominence
- Coracoid pain
- dysKinesia
Physical Exam

- Decreased IR
- Pec minor tightness, coracoid tender
- Protracted scapula
Physical Exam

- May have + impingment signs

- Provocative tests for SLAP tears
Conservative RX of dyskinesia

- Physical therapy
- Posterior capsular stretching
Conservative Rx of dyskinesia

- PT
- Pec minor stretching
Conservative Rx of dyskinesia

- PT- cuff and periscapular strengthening
  - Thrower’s ten
  - Isometrics
  - Ts, Ys, arrows
SLAP tears

- Tight posterior capsule
- Shifts center of rotation
- “peel back” of biceps anchor
Repair of SLAP tears
Poor mechanics $\rightarrow$ labral tears, internal impingment
Throwing Mechanics - Bad
Throwing mechanics - good
Elbow Stress fractures

- Medial epicondyle- little leaguer’s elbow
  - Usually heal with rest
  - High valgus load on elbow
  - Rarely avulsion with displacement needs fixation
Elbow Stress Fractures

- Olecranon
  - Present with proximal, posterior ulnar pain during throwing
  - Stress due to tricep traction during deceleration phase of throwing
  - TTP on exam
  - Usually respond to rest
  - Delayed healing $\rightarrow$ ORIF
Capitellar OCD

- Repetitive valgus load $\rightarrow$ radiocap compression
- Overhead throwing athletes
Capitellar OCD

- Treatment
  - Nondisplaced lesion on MRI - may heal
  - Loose, but not displaced - scope and pin in place
  - Loose, displaced - remove loose body, debride, possible osteochondral plug
MUCL Injuries

- Overuse injury

- Hx
  - Decreased speed
  - Medial elbow pain late cocking, early acceleration
  - Ulnar nerve sxs

- PE
  - Valgus stress
  - Milking maneuver
Valgus Instability of the UCL

- Originally described in javelin throwers
- Most common in baseball players today
- Also…volleyball, tennis, football

- Majority are “chronic overuse” type injuries
- Acute ruptures of the UCL do occur
UCL Reconstruction

Jobe Technique

- Pioneered in 1974 by Jobe
  - "Tommy John" procedure
  - First UCL reconstruction performed on a pitcher
  - Returned to pitch in MLB in 1976
    - 10-10 record in first season after injury
- Pitched for 26 years in MLB
  - Retired in 1989
Treatment UCL tears

- Caution: many young athletes want “A Tommy John”

- Partial
  - Intial conservative
  - Reconstruct if fail 6 mo nonop

- Complete
  - Reconstruction
  - 12 mo recovery
Prevention of shoulder and elbow overuse injuries

- Proper throwing mechanics
- Periscapular and rotator cuff strengthening
- Pec minor stretching
- Posterior Capsular stretching
- Core strengthening

UE is end of kinetic chain - off load with strong LE and core!
Proper Technique is Key

- Provide proper instruction on throwing mechanics
  - Discourage the teaching of curve balls until high school (puberty)
  - Ban the radar gun in youth sports
  - Mandate a 3 month “rest-period” each year for throwing athletes
Additional Prevention Strategies

Work with local athletic governing bodies to mandate pitch counts and limit number of matches or tournaments played.
More Prevention Strategies

- Encourage participation for fun and limit emphasis on winning
- Discourage early specialization
- Treat symptoms of problems/injury EARLY
Traumatic Shoulder Instability

- Abduction, ER stress → anterior, inferior dislocation w/labral tear
- Common in contact sports
- >80% recurrence in athletes < 20 yo!!!
- Labral repair prevents recurrence
Etiology

- Traumatic - Bankart lesion
- detachment of anterior capsulolabral complex from the glenoid rim
- leads to recurrent anterior instability
Apprehension/Relocation Test

Shoulder Arthroscopy, Snyder, 2003
Traumatic instability - Treatment

- Arthroscopic labral repair
- Open repair may be necessary with partial boney injury to glenoid
- Surgery can be delayed to end of season
Imaging: Shoulder and Elbow

- Always start with xrays- comparison views help in kids
- Shoulder- IR/ER rotation not helpful
  - AP
  - Scapular Y
  - Axillary lateral
- Elbow- eval for fx, loose bodies, OCD
  - AP, lateral, oblique
MRI- shoulder

- Include arthrogram when evaluating instability!
- Indications
  - r/o SLAP or Bankart
  - Eval for cuff or biceps injury
- Avoid open magnets, low tesla scanners
Example - Anterior Instability

MRA

Hill-Sachs
Example - SLAP tear MR Arthrogram
MRI elbow

- Indications
  - MUCL injury
  - OCD
  - Concern for plica, chondral loose bodies

- Get arthrogram when r/o MUCL injury/instability
Example - MUCL Tear
Bone scan or MRI for stress fx?

- Usually xray and PE suffice
- Contralateral xray if skeletally immature
- MRI preferred for physeal stress fractures
- Bone scan if MRI indeterminate
Thank You! Questions?